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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/716,920

Filing Date: November 19, 2003

Appellant(s): KRAMARZ ET AL.

Bryan H. Davidson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed December 8, 2008 appealing from the Office action mailed August 6, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

A. and C.-F. is correct.

B. is incorrect and should be corrected as follows:

This appeal involves claims 1, 3-9, and 12-28, finally rejected in the office action mailed August 6, 2008.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 4,426,542	BARKER et al.	1-1984
US 5,801,292	KWOK et al.	9-1998
GB 1,547,856	JUDGE et al.	6-1979
Halpern et al. "Choosing a Phase-Transfer Catalyst to Enhance Reactivity and Catalyst Separation. Part 1", R. Soc. Chem., Vol. 236 (1999), pp. 30-39		
Starks et al., "Phase-Transfer Catalysis, Fundamentals, Applications, and Industrial Perspectives", Chapman & Hall, New York, (1994), pp. 10 and 252-258		

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1, 3-9, and 12-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barker et al. (US 4,426,542) in view of Kwok et al. (US 5,801,292), Starks et al. (Phase Transfer Catalysis, 1994, pp. 482-488), Halpern et al. (Spec. Publ.-R. Soc. Chem, 1999, pp. 30-39) or Judge et al. (UK 1 547 856).

Barker et al. teach an aldol condensation reaction with carbon 5 and 6 aldehydes to produce a mixture comprising unsaturated aldehydes, which are hydrogenated to C12 or C14 alcohols (example 14). The aldol reaction takes place in the presence of aqueous sodium hydroxide and a tetrabutyl-ammonium chloride phase transfer catalyst (water-soluble phase-transfer catalyst). The aldol reaction is conducted at temperature upwards of 60°C up to 150°C or higher (see column 3, lines 15-20). It is taught that the aldehyde product mixture is subjected to an aldol reaction, followed by decantation and water washing or other simple procedures to separate the organic product-containing

phase from the aqueous phase. The product-containing phase is then hydrogenated, converting both the C5 aldehydes and C10 enals to the corresponding alcohols (see column 6, lines 25-32). The aldol reaction may be continuous or batch (see column 3, lines 60-65).

Barker et al. differ from the instant claims in that Barker et al. do not conduct an aldol reaction between mixed aldehydes having different numbers of carbon atoms.

Kwok et al. teach that it is commonly known that the aldol condensation reaction may be used not only for the condensation of a given aldehyde, but for the combination of different aldehydes, producing a so-called "cross aldol", provided that at least one of the aldehydes contains an alpha hydrogen (see entire disclosure, in particular column 1, lines 58-67). The aldehydes disclosed by Kwok et al. have the formula R1CHO and R2CHO, wherein R1 may be an alkyl group having from 1 to 12 carbon atoms and R2 may be a H atom or an alkyl group having from 1 to 12 carbon atoms (see column 3, line 46 to column 4, line 40). Kwok et al. further teaches that the unsaturated aldehydes may be hydrogenated to the desired product (see column 3, lines 5-19 and column 4, lines 40-42).

One having ordinary skill in the art at the time the invention was made would have found it obvious that the aldol condensation process disclosed by Barker et al. could be carried out utilizing different aldehydes, as disclosed by Kwok et al., including those aldehydes as claimed, with the expectation of obtaining the desired unsaturated aldehydes via a cross aldol condensation reaction, since Kwok et al. teach that aldol

condensations can be conducted on a given aldehyde as well as a combination of different aldehydes.

Barker et al. teach the claimed invention as disclosed above but fail to teach removing the phase transfer catalyst by water washing.

Halpern et al. teach removal of quaternary ammonium salts from organic phase with water washing (see pages 34 and 35).

One having ordinary skill in the art at the time of the invention was made would have found it obvious to remove the PTC from the reaction product of Barker et al., by water washing the PTC as taught by Halpern et al., since Halpern et al. teach that water washing has been shown to be an effective means for extracting quaternary ammonium salts from an organic phase.

Barker et al. fail to teach the claimed molar ratios. However, modification of concentration of reactants is often done to optimize conversions and yields. Further, a change in temperature, concentrations, or other process conditions of an old process does not impart patentability unless the recited ranges are critical, i.e., they produce a new and unexpected result. *In re Aller et al.*, (CCPA 1955) 220 F2d 454, 105 USPQ 233.

Barker et al. fail to teach using sodium hydroxide in a 10-50% weight solution.

Judge et al. teach an aldol concentration reaction wherein the alkali metal hydroxide solution is 4-50%, more preferably 5-15%, by weight (see page 3, lines 35-43).

One having ordinary skill in the art at the time the invention was made would have found it obvious to utilize an aqueous alkali metal solution, in the range taught by Judge et al., in the process of Barker et al., since Judge et al. has shown that this range is effective for use in aldol condensation reactions, which employ a phase transfer catalyst.

Barker et al. differ from the instant invention in that Barker et al. do not teach conducting the crossed-aldol reaction in a three-phase system.

Halpern et al. teach that there are several criteria to be considered when choosing a phase-transfer catalyst for a commercial phase-transfer catalysis application. The most important criteria are reactivity, separation of catalyst from the product, availability, the real cost of catalyst and solvent, method of environmentally acceptable disposal, catalyst stability and toxicity (see page 30). Halpern et al. compare three widely used PTCs, namely Aiquat®336 (methyl tricapryl ammonium bromide); Aliquat®100 (tetrabutyl ammonium bromide) and Aiquat®175 (methyl tributyl ammonium chloride). Halpern et al. teach that most PTC systems work at very high ionic strength, and that Aiquat®175 in particular, excels in PTC reactions using 50% NaOH. Halpern et al. teach that at these ionic strengths, even the most hydrophilic quat salts are salted out of the aqueous phase (see page 36). It is further taught on page 36 that in some cases with high ionic strength a third phase can be formed with tetrabutylammonium salts and a very high reactivity may be observed.

Starks et al. (see page 10 and pages 253-255) teach that tetrabutylammonium salts form a third layer (phase) when used in conjunction with an organic phase that has

little polarity and with a concentrated aqueous solution of inorganic salts. Starks et al. teach that in this situation, most of the reaction occurs in the third phase with both aqueous and organic reagents transferring to this phase for conversion, which allows for a faster reaction than with simple PTC reactions. Starks et al. teach that because formation of a third phase offers simplified catalyst removal and recovery procedures, third-phase catalysis is highly attractive for commercial operations.

One having ordinary skill in the art the time the invention was made would have been motivated to carry out the reaction of Barker et al. utilizing a third phase as taught Starks et al. and Halpern et al., since Starks et al. teach that third phase reactions may be faster than simple PTC reactions and formation of third phase offers simplified catalyst removal and recovery procedures and Halpern et al. teach that very high reactivity may be observed with the use of a third phase.

(10) Response to Argument

In response to Appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In the instant case the Examiner only uses knowledge, i.e., the use of a phase transfer catalyst to make an alcohol via an aldol condensation and hydrogenation

(Barker et al.) and the use of aldehydes having different numbers of carbon atoms in a cross-alcohol condensation (Kwok et al.), which was within the level of ordinary skill at the time the claimed invention was made.

The Appellants submit that it is critical to Kwok et al. that hydrated MgO be employed as the catalyst. This argument should not be persuasive because although the use of a MgO catalyst is critical for the invention of Kwok et al. it is not critical for a cross-alcohol condensation reaction, the reason for which the Examiner is applying Kwok et al. as a reference. As is known in the art and taught by both Barker et al. and Kwok et al. alcohol condensation reactions, including cross-alcohol condensation reactions can be conducted in the presence of other catalyst besides MgO catalysts, for example alkali catalysts are known to catalyze alcohol condensation reactions (see column 3, lines 51-53 of Barker et al. and column 1, lines 58-65 of Kwok et al.). The Examiner applied Kwok et al. as a reference for its teaching that it is commonly known that the alcohol condensation reaction may be used not only for the condensation of a given aldehyde, but for the combination of different aldehydes, producing a so-called "cross alcohol", provided that at least one of the aldehydes contains an alpha hydrogen (see entire disclosure, in particular column 1, lines 58-67). Thus, the Examiner concluded that based upon the combined teaching of Barker et al. and Kwok et al., one having ordinary skill in the art at the time the invention was made would have found it obvious that the alcohol condensation process disclosed by Barker et al. could be carried out utilizing different aldehydes, as disclosed by Kwok et al., including those aldehydes as claimed, with the expectation of obtaining the desired unsaturated aldehydes via a cross alcohol

condensation reaction, since Kwok et al. teach that aldol condensations can be conducted on a given aldehyde as well as a combination of different aldehydes. Thus, the Examiner disagrees that the ordinary skilled person having knowledge of Kwok et al. would be lead directly away from using mixed aldehydes in a cross-aldol reaction in which a water soluble quaternary ammonium or phosphonium salt was employed as the water soluble phase transfer catalyst.

The Appellants acknowledge that Barker et al. disclose at column 3, lines 51-43 that the "...aldol reaction can utilize strongly alkaline catalyst, such as sodium and potassium hydroxide, or sodium and potassium cyanide." And Kwok et al. discloses at column 1, lines 58-62 that "...the aldol condensation reaction may be used...for the combination of different aldehydes, producing a so-called "cross aldol", provided that at least one of the aldehydes contains an a hydrogen." However, the Appellants believe that this disclosure most certainly does *not* direct an ordinarily skilled person to a water-soluble PTC generally, or a *quaternary ammonium or phosphonium salt* specifically. As noted above, Kwok et al. actually instructs the ordinarily skilled person that MgO is *critically* required for crossed-aldol reactions. These arguments should not be persuasive because 1) it is Barker et al. that is relied upon for teaching the use of a water-soluble PTC not Kwok et al. and 2) Kwok et al. do not teach that MgO is *critically* required for crossed-aldol reactions in fact both Barker et al. and Kwok et al. teach that aldol condensation reactions, including cross-aldol condensation reactions, can be conducted in the presence of alkali catalysts (see column 3, lines 51-53 of Barker et al. and column 1, lines 58-65 of Kwok et al.).

The Appellants argue that Judge et al. fail to teach or suggest using a water soluble PTC in a cross-alcohol reaction. This argument should not be persuasive because as pointed out above it is Barker et al., the primary reference, that teach the use of a water-soluble PTC. Judge et al. is applied as a reference to show that it was known at the time of the invention that the use of an aqueous base comprising a 10-50 weight percent solution of sodium hydroxide was effective for use in alcohol condensation reactions.

The Appellants argue that the Examiner correctly stated that Starks et al. fail to teach recovering the phase-transfer catalyst from the water washing. However, the Examiner has not made such a statement. The Examiner did state that Starks et al. teach that formation of a third phase offers simplified catalyst removal and recovery procedures.

The Appellants argue that Halpern et al. do not teach any specific use of Aliquat 100 and Aliquat 175 in a crossed-alcohol reaction as claimed in the present application. This argument should not be persuasive because Halpern et al. is applied for its teaching of the use of a three-phase system when using water soluble PTC.

The Appellants argue that one skilled in the art would not disregard the teaching of Judge et al. with respect to the use of the non- or only minimally water soluble PTC of Judge et al. and substitute therefore a fully water soluble PTC as taught by the present Appellants. This argument should not be persuasive because it is Barker et al., the primary reference, that teach the use of a water-soluble PTC. Judge et al. is applied as a reference to show that it was known at the time of the invention that the use of an

aqueous base comprising a 10-50 weight percent solution of sodium hydroxide was effective for use in aldol condensation reactions which employed a PTC.

The Appellants argue that comparison of the data in the Examples of the subject application (which employs a water soluble PTC in accordance with the present invention) with Comparative Example 2 (which employs a PTC in accordance with Judge et al., namely tricaprylmethylammonium chloride) that two yield improvements are evident. This argument and/or evidence should not be persuasive or should be considered irrelevant because the comparison is between a water-soluble PTC and a water-insoluble PTC. However, the primary reference, Barker et al., teach the use of tetrabutylammonium chloride, which is a water soluble PTC. Thus, Appellants' comparisons are not being made with the closest prior art.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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